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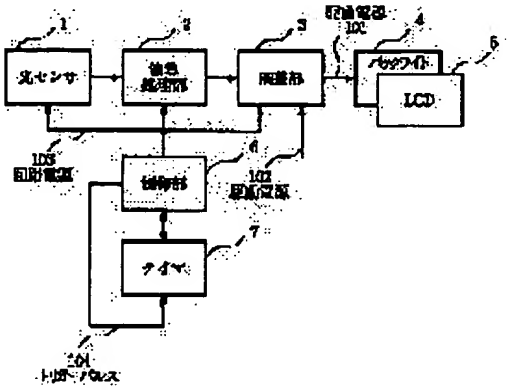
21)Application number : 09-030434
(22)Date of filing : 14.02.1997
(71)Applicant : NIPPON DENKI IDO TSUSHIN KK
(72)Inventor : SUZUKI TAKAHARU

(54) LCD DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To more reduce a power consumption by adjusting the luminance of a back light automatically to optimum luminance according to peripheral illuminance, and performing this luminance adjustment intermittently.



SOLUTION: When the power source is turned on, a timer 7 outputs a timing pulse and a control part 6 turns on a circuit power source 103. An optical sensor 1 is installed nearby an LCD 5 to measure the peripheral illuminance, and an arithmetic process part 2 calculates the optimum luminance of the back light 4 from a specific calculation expression and outputs it as a digital signal to an adjustment part 3. The adjustment part 3 adjusts the driving current 101 of the back light 4 so as to obtain the luminance specified with the digital signal. This adjustment is performed by controlling the pulse width of the direct current of a driving power source 102, and held until next sampling pulse generation even if the circuit power source 103 turns off. When this operation is completed, the control part 6 turns off the circuit power source 103 and sends a trigger pulse 104 to the timer 7, which outputs a timing pulse a specific time after the above point of time to start adjusting operation.

LEGAL STATUS

[Date of request for examination] 14.02.1997

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 2891955

[Date of registration] 26.02.1999

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] LCD display characterized by providing the following. The photosensor which measures the illuminance of the LCD circumference. The data-processing section which calculates the optimal brightness of the back light of Above LCD to the measurement illuminance of the aforementioned photosensor. The controller which adjusts the drive current of the aforementioned back light so that it may become the optimal brightness which the aforementioned data-processing section calculated. The control section carry out a series of control which operates the aforementioned photosensor, the aforementioned data-processing section, and the aforementioned controller, the aforementioned back light is adjusted [control] to the optimal brightness, and this optimal brightness is held [control], and stops operation of each part of the above when the aforementioned timing pulse is inputted as the timer which inputs a trigger pulse and generates a timing pulse after predetermined time progress, and generate the aforementioned trigger pulse after this completion of control.
[Claim 2] The aforementioned control section is LCD display according to claim 1 characterized by having the circuit which holds the drive current of the aforementioned photosensor, the circuit which turns on and off the power supply of the aforementioned data-processing section, and the aforementioned controller according to the aforementioned timing pulse, and turns other power supplies on and off.
[Claim 3] The aforementioned controller is the claim 1 characterized by adding the circuit which can adjust the drive current of the aforementioned back light manually, or LCD display given in two.
[Claim 4] The aforementioned timer is the claims 1 and 2 characterized by having the equalization circuit which adjusts the generating time of a timing pulse arbitrarily, or LCD display given in three.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Especially this invention relates to the LCD display used for the terminal equipment used in the environment where circumference illuminances, such as a portable telephone, change about LCD display.
[0002]
[Description of the Prior Art] This kind of LCD display measures the circumference illuminance of LCD by the photosensor, the brightness of the most legible back board in this illuminance is calculated, a back board is automatically adjusted to this brightness, and a user needs to be made not to do a brilliance control purposely.
[0003] Conventionally, as this kind of LCD display, there are some which were indicated by JP,5-265401,A, for example. No matter this may start work in what place, according to the luminosity of the place in which a user is present now, the brightness of a liquid crystal display (LCD) is automatically made into legible brightness. That is, emitting light with the contrast volume which can change the contrast of LCD manually, the brightness volume which can adjust the brightness of LCD with automatic/hand control, and the photosensor section which measures an external luminosity are consisted of by the back light section which illuminates LCD from behind, and the intensity-control section which deduces brightness predetermined by the illuminance data sent from the photosensor section is prepared in the main part of a computer. Thereby, the photosensor section makes the back light section emit light so that an external luminosity may be told to the intensity-control section and it may become the brightness of the optimal liquid crystal display for a user about quantitive illuminance data in it.
[0004]
[Problem(s) to be Solved by the Invention] Thus, in the conventional example, a back board is automatically adjusted to legible brightness, and a user does not adjust purposely, but it carries out, and although it is legible and being made, for this reason, circuits, such as the intensity-control section, are added, the circuit is complicated, and there is a problem that power consumption increases. Especially in terminals, such as a portable telephone, the increase in power consumption is the problem which must be avoided.
[0005]
[Means for Solving the Problem] The photosensor to which the LCD display of this invention measures the illuminance of the LCD circumference, The data-processing section which calculates the optimal brightness of the back light of Above LCD to the measurement illuminance of the aforementioned photosensor, The controller which adjusts the drive current of the aforementioned back light so that it may become the optimal brightness which the aforementioned data-processing section calculated, The timer which inputs a trigger pulse and generates a timing pulse after predetermined time progress, When the aforementioned timing pulse is inputted, operate the aforementioned photosensor, the aforementioned data-processing section, and the aforementioned controller, adjust the aforementioned back light to the optimal brightness, and this optimal brightness is held. It has the control section which performs a series of control which stops operation of each part of the above, and generates the aforementioned trigger pulse after this completion of control.
[0006] For example, the aforementioned control section may be equipped with the circuit which holds the drive current of the aforementioned photosensor, the circuit which turns on and off the power supply of the aforementioned data-processing section, and the aforementioned controller according to the aforementioned timing pulse, and turns other power supplies on and off.
[0007] Moreover, the aforementioned controller may add the circuit which can adjust the drive current of the aforementioned back light manually.
[0008] Furthermore, the aforementioned timer may be equipped with the equalization circuit which adjusts the generating time of a timing pulse arbitrarily.

[0009]
[Embodiments of the Invention] Next, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is the block diagram showing the example of a gestalt of operation of this invention. Drawing 2 is a flow chart explaining operation of drawing 1 .
[0010] In drawing 1 this LCD display LCD4 of a liquid crystal display, The back board 5 which emits light from behind this LCD4, and illuminates LCD, The photosensor 1 which measures the surrounding illuminance of LCD5, and the data-processing section 3 which calculates the optimal brightness of the back light 4 of LCD5 to the measurement illuminance of a photosensor 1, The controller 3 which adjusts the drive current of a back light 4 to the optimal brightness which the data-processing section 3 calculated, The timer 7 which inputs a trigger pulse and generates a timing pulse after predetermined time progress, A timing pulse When it inputs, the brilliance control of the back light 4 which a photosensor 1, the data-processing section 2, and the controller 3 were operated, and mentioned them above is performed, after this completion holds the starting current of a controller 3, and others consist of a series of control which stops operation, and a control section 6 which generates a trigger pulse after this completion of control.
[0011] The control section 6 is especially equipped with the circuit which holds the drive current of a circuit and a controller 3 which turns on and off the power supply of a photosensor 1 and the data-processing section 2 according to a timing pulse, respectively, and turns other power supplies on and off.

[0012] Moreover, the controller 3 was equipped with the circuit which can adjust the drive current of the aforementioned back light manually, and the timer 7 is further equipped with the equalization circuit which adjusts the generating time of a timing pulse arbitrarily.
[0013] Next, operation about a brilliance control is explained with reference to drawing 2 . In drawing 2 , if a power supply is first supplied to a timer 7 and a control section 6, a timer 7 will start operation and will output a timing pulse (S101). A control section 6 supervises this timing pulse, judges the timing of a measurement start, sets the circuit power supply 103 of a photosensor 1, the data-processing section 2, and a controller 3 to ON, and makes each part operating state.
[0014] The photosensor 1 is installed near LCD5 and measures the illuminance of the circumference of it (S103). The measured value is inputted into the data-processing section 2 with a digital signal, the optimal brightness of a back light 4 is computed in a here predetermined formula, and the result is outputted to a controller 3 with a digital signal (S104).
[0015] A controller 3 adjusts the drive current 101 of a back light 4 so that it may become the specification brightness of this digital signal (S105). This adjustment is performed by carrying out pulse width control of the direct current of the drive power supply 102, and even if the circuit power supply 103 is turned off to generating of the following sampling pulse, it holds. When the above operation is completed, a control section 6 makes off the circuit power supply 103 of a photosensor 1, the data-processing section 2, and a controller 3, and sends out a trigger pulse 104 to a timer 7. A timer 7 begins a count from the input time of this trigger pulse, outputs a timing pulse again after predetermined time, and starts adjustment operation again. Since it can carry out adjustable [of the counter time of a timer 7], its change of an illuminance is long in few environment, and it carries out a short **** setup in many environments.
[0016] In addition, calculation of the optimal brightness in operation part 2 is performed by the following formula.
[0017] L=L1+(R-R1) x (L2-L1)/LOG (R2-R1)
R: The measurement illuminance by the photosensor, the minimum capacity value of an R1:photosensor, the upper limit capacity value of an R2:photosensor, an L:proper reference value, the reference value at the time of L1:minimum capacity, L2 : the reference value at the time of upper limit capacity [an effect of the invention] Since especially this brilliance control is performed at the time of ****** although power consumption can also be lessened that it is easy to use since the LCD display of this invention corresponds to a surrounding illuminance automatically and is adjusting the brightness of a back light to optimal brightness as explained above, there is an effect of much more power

consumption curtailment.

[Translation done.]

TECHNICAL FIELD

[The technical field to which invention belongs] Especially this invention relates to the LCD display used for the terminal equipment used in the environment where circumference illuminances, such as a portable telephone, change about LCD display.

[Translation done.]

PRIOR ART

[Description of the Prior Art] This kind of LCD display measures the circumference illuminance of LCD by the photosensor, the brightness of the most legible back board in this illuminance is calculated, a back board is automatically adjusted to this brightness, and a user needs to be made not to do a brilliance control purposely.

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[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Since especially this brilliance control is performed at the time of ****** although power consumption can also be lessened that it is easy to use since the LCD display of this invention corresponds to a surrounding illuminance automatically and is adjusting the brightness of a back light to optimal brightness as explained above, there is an effect of much more power consumption curtailment.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Thus, in the conventional example, a back board is automatically adjusted to legible brightness, and a user does not adjust purposely, but it carries out, and although it is legible and being made, for this reason, circuits, such as the intensity-control section, are added, the circuit is complicated, and there is a problem that power consumption increases. Especially in terminals, such as a portable telephone, the increase in power consumption is the problem which must be avoided.

[Translation done.]

MEANS

[Means for Solving the Problem] The photosensor to which the LCD display of this invention measures the illuminance of the LCD circumference, The data-processing section which calculates the optimal brightness of the back light of Above LCD to the measurement illuminance of the aforementioned photosensor, The controller which adjusts the drive current of the aforementioned back light so that it may become the optimal brightness which the aforementioned data-processing section calculated, The timer which inputs a trigger pulse and generates a timing pulse after predetermined time progress, When the aforementioned timing pulse is inputted, operate the aforementioned photosensor, the aforementioned data-processing section, and the aforementioned controller, adjust the aforementioned back light to the optimal brightness, and this optimal brightness is held. It has the control section which performs a series of control which stops operation of each part of the above, and generates the aforementioned trigger pulse after this completion of control.
[0006] For example, the aforementioned control section may be equipped with the circuit which holds the drive current of the aforementioned photosensor, the circuit which turns on and off the power supply of the aforementioned data-processing section, and the aforementioned controller according to the aforementioned timing pulse, and turns other power supplies on and off.
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[Translation done.]

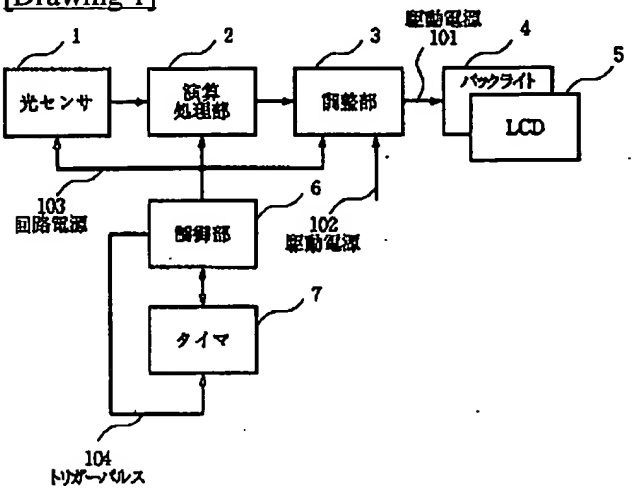
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the example of a gestalt of operation of this invention.
[Drawing 2] It is a flow chart explaining operation of drawing 1 .
[Description of Notations]
1 Photosensor
2 Data-Processing Section
3 Controller
4 Back Light
5 LCD
6 Control Section
7 Timer

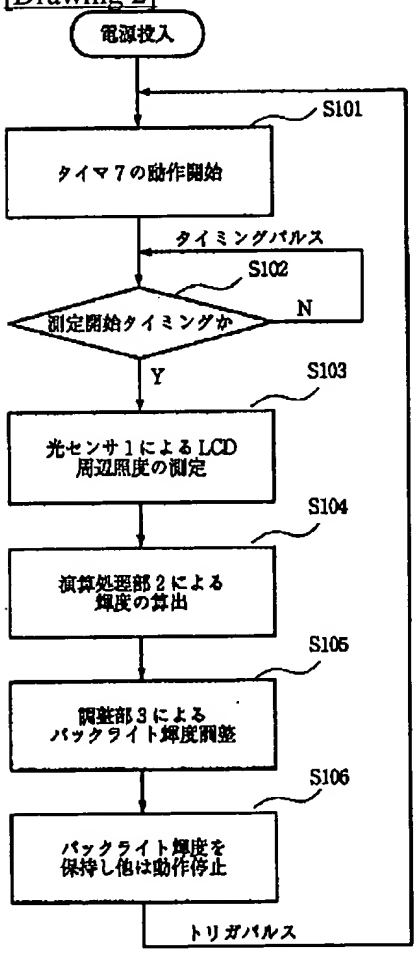
[Translation done.]

DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]

PAT-NO: JP410228010A
DOCUMENT-IDENTIFIER: JP 10228010 A
TITLE: LCD DISPLAY DEVICE

Title of Patent Publication - TTL (1):

LCD DISPLAY DEVICE

Abstract - FPAR (2):

SOLUTION: When the power source is turned on, a timer 7 outputs a timing pulse and a control part 6 turns on a circuit power source 103. An optical sensor 1 is installed nearby an LCD 5 to measure the peripheral illuminance, and an arithmetic process part 2 calculates the optimum luminance of the back light 4 from a specific calculation expression and outputs it as a digital signal to an adjustment part 3. The adjustment part 3 adjusts the driving current 101 of the back light 4 so as to obtain the luminance specified with the digital signal. This adjustment is performed by controlling the pulse width of the direct current of a driving power source 102, and held until next sampling pulse generation even if the circuit power source 103 turns off. When this operation is completed, the control part 6 turns off the circuit power source 103 and sends a trigger pulse 104 to the timer 7, which outputs a timing pulse a specific time after the above point of time to start adjusting operation.

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